

Plenary Talks

Molecular Imaging with Optical, Magnetic Resonance, and Radioisotope Techniques: Potentials and Relative Limitations

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Advances in optical techniques of fluorescence and bioluminescence; molecular engineering of tracers or probes for magnetic resonance, ultrasound, and emission tomography have lead to new directions in research and new strategies for the diagnosis and treatment of diseases. In the last 10 years the resolution, speed, volume of coverage and commercial availability of non-invasive imaging methods have improved many fold and at the same time the contrast resolution for metabolic and functional imaging of the body has shifted the thrust of medical imaging from anatomy to to function and identification of specific molecules and genes by in vivo imaging.

The technology advances include photodiode arrays for optical methods, high field magnets proposed to 12 Tesla for functional imaging and multinuclear spectroscopy, 3D ultrasound and positron tomography systems with 2 mm resolution for animals and people. The engineered molecular probes have the potential do image specific enzyme expression and protein receptor patterns specific to diseases such as breast cancer, congestive heart failure, drug addiction and progressive stroke. This presentation will highlight current and future technological advances in the context of major diseases such as Alzheimer's disease, manic depressive diseases, heart failure, spinal vertebrae diseases, breast cancer and prostate cancer.

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